Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Chapter 2**

1. A particle’s position at time t is =  m. compute its average velocity over [2, 5] and estimate its instantaneous velocity at (showing both left- and right-hand values).
2. Evaluate or state that it does not exist.

a.  b. 

c. 



1. Evaluate. 



1. Evaluate. 



1. Sketch the graph of a function f(x) such that

, , 

1. Sketch the graph of a function g(x) such that 



1. Discuss the discontinuity of the function F(x) defined by

F(x) = 

8. Evaluate lim 



1. Calculate lim 



1. Evaluate lim 



1. Use the Bisection Method to locate a zero (root) of =0 to two decimal places.
2. Use the IVT to prove that  has a root (zero) in the interval [0, 2].

**Chapter 3**

1. Supposing that , use the definition of the derivative to find f’(-1).
2. Supposing the , use the definition of the derivative to find f’(2) and then find the equation for the tangent line at x = 2.
3. Find the equation of the tangent line to  at x = 16.

Use the Product or Quotient Rules to solve problems 4 – 6.

1. Find the Derivative of .
2. Find the Derivative of .

6. Find the equation of the tangent line to  at x = 9.

1. Find the derivative of the following functions.

a. 

b.  + 

c. 

1. The population P(t) of Freedonia in 1933 was P(1933) = 5 million.
   1. What is the meaning of P’(1933)?
   2. Estimate P(1934) if P’(1933) = 0.2. What if P’(1933) = 0?
2. Find the Rate of Change of the volume of a cube with respect to the length of its side *s* when *s* = 3 and *s* = 5.
3. The height in feet of a helicopter at time *t* in minutes is  for .
   1. Plot the graphs of height s(t) and velocity v(t).

y

x

2 4 6 8 10 12

* 1. Find the velocity at t = 6 and t = 7.

* 1. Find the maximum height of the helicopter.

11. It takes a stone 3 seconds to hit the ground when dropped from the top of a building. How high is the building and what is the stone’s velocity on impact?

Calculate the second and third derivative.

1. y =7 – 2x 2.

Calculate the indicated derivative.

1. t=1

Find the equation of the tangent line on the point indicated.

1. y=

Find the derivative.

5. ,

Calculate the second derivative.



Find the derivative of the following:

1. 8.
2. 10.

Calculate the derivative of y with respect to x.



Find the equation of the tangent line at the given point.



Find the derivative.

1. 17.

Find the derivative.

1. y = x lnx \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. y = ln (tan x) \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Find an equation of the tangent line at the point indicated.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Related Rates

1. A 16-ft ladder leans against a wall. The bottom of the ladder is 5 ft. from the wall at time t = 0 and slides away from the wall at a rate of 4 ft/s. Find the velocity of the top of the ladder at time t = 1. (Draw a picture and define variables.)
2. Water pours into a fish tank at a rate of 4 ft3/min. How fast is the water level rising if the base of the tank is a rectangle of dimensions 3 X 4 ft?
3. The radius of a circular oil slick expands at a rate of 3 m/min.
4. How fast is the area of the oil slick increasing when the radius is 30 m?
5. If the radius is 3 m at time t = 0, how fast is the area increasing after 3 minutes?
6. The Volume of a sphere is. Assume that its radius *r* is expanding at a rate of 15 in./min. Determine the rate at which the Volume is changing with respect to time when

r = 8 in.

**I. Multiple Choice**

\_\_\_\_\_ 1. The largest interval on which  is increasing is

(A)  (B)  (C)  (D)  (E) 

\_\_\_\_\_ 2.  has an absolute minimum on  of

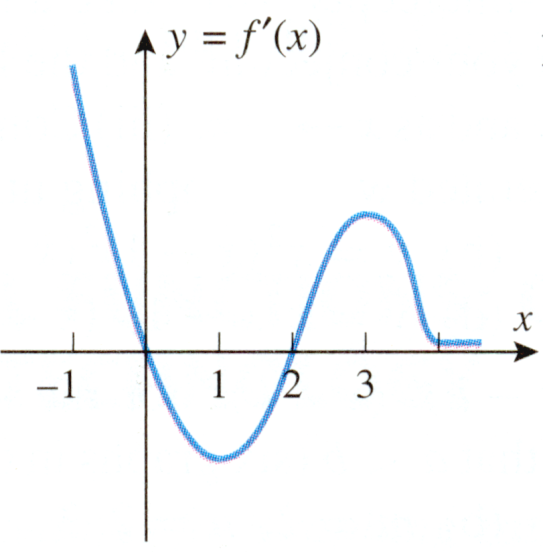
(A) 2 (B) –2 (C) 52 (D) –52 (E) 0

\_\_\_\_\_\_3. Determine the value of *c* that satisfies the Mean Value Theorem for  on .

(A) 0 (B)  (C)  (D)  (E) 

\_\_\_\_\_ 4.  has

(A) a relative maximum at x = 4

 (B) a relative minimum at x = 4

(C) a relative maximum at x = -4

(D) a relative minimum at x = -4

(E) a relative minimum at x = 0

5-6. Use the graph of  shown in the figure to answer the

questions below.

\_\_\_\_\_ 5. Determine the x-coordinates where  has a relative

minima.

(A)  (B)  (C)  (D)  (E) 

\_\_\_\_\_ 6. Determine the x-coordinates where  has a point of inflection.

(A)  (B)  (C)  (D)  (E) 

\_\_\_\_\_ 7.  is concave up on

(A)  (B)  (C)  (D) nowhere (E) 

\_\_\_\_\_ 8. Use differentials to approximate .

(A)2.225 (B)2.250 (C)2.214 (D)2.450 (E) None of these

**II. Free Response**

9 . Give the following information for the function:



Derivative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Increasing on ( \_\_\_ , \_\_\_ ) and ( \_\_\_ , \_\_\_ )

Decreasing on ( \_\_\_ , \_\_\_ )

Relative Maximum at ( \_\_\_ , \_\_\_ )

Relative Minimum at ( \_\_\_ , \_\_\_ )

Second Derivative: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Concave Up on ( \_\_\_ , \_\_\_ )

Concave Down on ( \_\_\_ , \_\_\_ )

Points of Inflection at( \_\_\_ , \_\_\_ )